



**ENGINEERS
AUSTRALIA**
Northern Division

Submission for an Historic Engineering Marker (HEM)

Adelaide River Railway Bridge

**Town of Adelaide River
Northern Territory**

May 2003

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Commemorative Plaque Nomination Form

Date: May 2003

From: Engineers Australia,
Northern Division

To:
Commemorative Plaque Sub-Committee
Engineers Australia
Engineering House
11 National Circuit
BARTON ACT 2600

The following work is nominated for an: -

- Historic Engineering Marker

Name of Work: Adelaide River Railway Bridge

Location: Situated adjacent to Stuart Highway, on the former North Australia Railway Line in Adelaide River. Lot 186, Town of Adelaide River (This is the ADrail corridor). In addition Lot 194A, Town of Adelaide River is an administrative lot that covers the heritage listed area which runs from the old railway station to the bridge.

The bridge was identified as North Australia Railway Number 139 and it was 123.7 km from Darwin or 76.5 miles from the jetty abutment at Palmerston (Darwin) when it was built.

Map Reference: Batchelor 5171 282 351

Latitude S 13°14.27, Longitude E 131 °06.26

Datum GDA94, Zone 52, 728 332 East 8 535 270 North

Owner:

AustralAsia Railway Corporation, GPO Box 4796, Darwin, Northern Territory 0801

Registered on the Register of the National Estate (26/03/1985), Database Number: 000052
File Number: 7/03/008/0018/01.

Listed as a Heritage Place under the NT Heritage Conservation Act – 8 July 1997.
Adelaide River Railway Bridge.

The owners, AustralAsia Railway Corporation and Asia Pacific Transport have been advised of the nomination of the work and have indicated approval for the submission and the placement of the Historic Engineering Marker at the site. Copies of the approval letters are attached.

A letter has also been received from the Minister For the Environment and Heritage (Northern Territory) indicating approval to place the plaque under stipulated conditions. A copy of this letter is attached.

Access to Site:

The bridge is located on land owned by the AustralAsia Railway Corporation and their approval is required to gain access. A new bridge is located immediately down-stream from the subject railway bridge so that the old bridge will be immediately adjacent to an operational railway line when the

Alice Springs to Darwin Railway is commissioned towards the end of 2003. However it may be possible to gain approval from AustralAsia Railway Corporation for access to the southern end of the bridge where the plaque is proposed to be located from the Dorat Road level crossing which is approximately 300 metres south of the bridge. Ongoing access may be contingent on fencing the access from Dorat Road.

The old bridge can be viewed from the Stuart Highway which is immediately down-stream from the new railway bridge.

There is a possibility that a section of the old North Australia Railway will be reconstructed from the Adelaide River Railway Station (an existing heritage site) to Snake Creek, a historic ammunition storage area approximately 7 km north of Adelaide River. If this occurs the old Adelaide River Railway Bridge would again carry an operational railway line. This project would be designed to be compatible with viewing of the plaque on the Adelaide River Railway Bridge.

Future Care and Maintenance of the Work:

The bridge will require only minimal care and maintenance.

Some maintenance has been carried out in recent times by The Friends of the Adelaide River Railway Station.

This volunteer group is ideally placed to care for the bridge in the long term. Local Adelaide River residents and members of the Institution of Engineers, Australia, Northern Division are members of this group.

Name of Sponsor:

Engineers Australia, Northern Division.

.....
**Chairperson of Nominating Committee
 Engineering Heritage Australia (Northern)**

Statement of Significance

The Adelaide River Railway Bridge is historically significant as a part of the North Australia Railway (NAR) which brought rail transport to the Northern Territory in the late 1880's. A large metal bridge of the period, the structure reflects high technical accomplishment particularly in view of its remote location. The bridge is a notable feature of the Adelaide River landscape.

The bridge is of steel lattice girder construction, 155 m long, approximately 4 m wide, spanning the Adelaide River. The bridge carried the railway line of the former North Australia Railway, on wooden sleepers. The bridge is built in five 31m spans, on transoms supported by four pairs of cylindrical cast iron piers embedded in concrete foundations, with concrete abutments at both ends.

The bridge design was finalised by the South Australia Railway Engineer-in-Chief's office in 1885. The bridge components were manufactured in South Australia and erected in 1888 during construction of the NAR. Special effort was made to complete the construction before the onset of the Wet season.

In his book "The Never Never Line", J.Y Harvey gives some idea of the times: "The bridge site hummed with activity. At ground level small gangs of coolies could be seen sinking the deep foundation shafts, digging their way through the rich alluvial soil until they found bedrock..... One hundred feet back towards the north bank another gang was busy erecting the bridge piers (twin iron columns braced with iron straps). Perched on their spindly scaffolding the gang laboured to position the heavy tubes..... Next came the skilled artisans whose task it was to erect large open web girders, two of which formed the main spans....."

On 8 December 1888 the locomotive "Silverton" hauled the first scheduled train across the bridge. The bridge was used by rail traffic until the NAR closed in 1976. In 1941/42 the bridge was provided with longitudinal wooden decking to allow military and other road transport access across the river in times of seasonal flooding. The bridge was further upgraded in 1952 and continued to be used by vehicles during the Wet season until 1980.

The bridge is one of three large bridges on the NAR however the other two were built considerably later in 1917 (Fergusson River) and 1928 (Katherine River).

Being of substantial length and scale, and constructed of steel and timber according to late nineteenth century design, it has immense social value as tangible evidence of the now defunct NAR which had enormous importance to the historical and social development of the Top End of Australia.

The bridge is showing some signs of lack of maintenance since 1976 however the structure is in good condition. With some planned maintenance it will continue to be a significant feature of Railway Heritage Precinct and the township of Adelaide River.

The placement of an Historic Engineering Marker at the bridge will highlight the engineering accomplishment of the time and once again demonstrate the importance of engineering in the development of Northern Australia.

Northern Division Heritage Group

This structure is listed in the Register of the National Estate, listed as a Heritage Place under the NT Heritage Conservation Act and is listed by the National Trust of Australia.

Citation

ADELAIDE RIVER RAILWAY BRIDGE

The Adelaide River Railway Bridge was constructed in 1888 as part of the North Australia Railway and was the largest bridge on the line north of Pine Creek. The railway closed in 1976. The bridge played a significant role in the development of the Top End of the Northern Territory during its 88 years of service, played a key strategic role during the Second World War and remains a significant landmark along the Stuart Highway.

The proposed plaque will be placed at the site near the southern abutment. See Additional Supporting Information for details of proposed mounting arrangements.

Additional Supporting Information

Name of Work:

Adelaide River Railway Bridge

Note that there is a new railway bridge immediately adjacent to the subject bridge which will serve the new Alice Springs to Darwin Railway when it is commissioned in late 2003. This bridge should not be confused with the subject bridge.

Orientation:

The actual bearings of the bridge are approximately 122 degrees/302 degrees, that is closer to east/west than north/south. However the overall route of the railway between Darwin and Pine Creek has a bearing of approximately 150 degrees/330 degrees, that is closer to north/south than east/west. For consistency in this document, and in order to be consistent with descriptions of features throughout the length of the Darwin to Pine Creek railway the following convention has been used:

Features to the right of the railway (using a straight line between Darwin and Pine Creek as a reference) are described as EAST of the railway.

Features to the left of the railway (using a straight line between Darwin and Pine Creek as a reference) are described as WEST of the railway.

Description:

A "through" crossed lattice girder design, 152.5 metres in total length comprises five, 100 feet (30.48 metres) spans of 3.1 metre high girders at 4.54 metres centres. The bridge is of all riveted construction.

Girder top and bottom chords comprise a 540x10mm plate flange with twin, spaced, 300x10mm plate webs, each riveted to the flange with back to back 75x75mm rolled angle fillets. Vertical girder end plates are similar but webs are reduced to 250mm.

The main girder lattices are generally lattice trusses themselves, 340mm deep with 150x75mm "T" section chords and 50x8mm rivetted lattices. Two solid section flat bar braces are substituted for trusses at each main girder end.

The bridge is supported on concrete abutments at each end and by four intermediate pairs of concrete filled, 1.06 metre diameter tubular, cast iron columns, 16.46 metres high at their highest point. Columns are steel cross braced and are supported on reinforced concrete base caps over concrete filled iron tubular caissons taken down to bed rock.

The original transoms are 160mm wide "I" sections formed up of 10mm plate webs with top and bottom flanges of back to back 75x75mm rolled angles riveted on. The bottoms of the webs are profiled to reduce in depth from 450mm between pairs of intercostal longitudinal sleeper bearers, to 250mm at each outer end. They are fixed to the top of the bottom chord of the girders at each lattice intersection, a total of 11 to each girder.

The sleeper bearers are 160x330mm deep "I" section, assembled from 10mm plate webs and back to back rivetted 75x75mm angle flanges and fixed between the transoms using back to back 75x75mm angle fillets. The bearers supported the 178x227mm deep timber sleepers.

Lateral stability of the original girders was provided, at the ends only, by 125x100mm rolled steel "T" section braces fixed between the tops of the vertical girder end plates and 1.7 metre long horizontal tapering extensions to the end transoms.

In subsequent structural upgrading of the bridge, rolled steel, taper flange, doubler transoms were installed below the level of the bottom chords of the girders, utilising welded straps, spacers etc. These "new" transoms bear rolled bas relief stating "LANARKSHIRE STEEL COY LTD SCOTLAND 20x6 ½" (598x165mm) and "BRITISH + STEEL" in a chevron style surround. Every second one is cantilevered out 1.7 metres past the outside line of the girders to support 150x150mm rolled steel angle braces welded between the outer ends of the transoms and the top chords of the girders.

These crude additions contrast sharply with the original's finesse.

Conservation Assessment by Peter Dermoudy Sep 92

Principal Construction Material:

It is not clear if the material used in the original construction of the structural members of the bridge was wrought iron, steel or a mixture of wrought iron and steel.

The construction drawings do not state the material to be used although they do refer to "Details of Ironwork" in several places. The construction of the bridge in 1888 is right at the point in history where either material could have been used. Wrought iron was an excellent construction material for structures such as bridges as it had strength which was greater in one direction (the direction in which the material was rolled, forged or otherwise formed and it has a high resistance to corrosion. It was also quite malleable whereas early steel tended to be brittle.

Inspection of the deterioration of material in wet areas of the Adelaide River Bridge shows remarkably little corrosion considering the age of the structure, its location in the tropics and the lack of maintenance particularly in the last quarter of a century. This tends to support the material being wrought iron.

Only destructive testing would determine the actual material used. There is no material known which can be identified as a part of the original structure which is not still a part of the heritage structure. Hence destructive testing is impracticable.

Further research may answer this issue. In the absence of a definitive statement, it has generally been assumed throughout this document that the material is "steel" except where quotes state otherwise.

The following quote from Jim Harvey's book *The Never Never Line*, page 30, addresses the issue of the material used in the bridge, and other smaller metal structures: "Millar's policy seems to have been to use subcontractors wherever they could be used to advantage. One of the first to be engaged was the well regarded engineering firm James Martin and Co of Gawler. Their task was to supply and fabricate hundreds of tons of wrought-iron work needed for the three hundred and ten bridges and flood openings which Millar had to erect between Palmerston and Pine Creek".

Year of Construction:

Design work was carried out by the South Australian Railways Department under the guidance of Engineer-in-Chief, H.C. Mais, between September 1884 and June 1885. The drawings are signed by him and dated "1/8/85".

The first locomotive crossed the completed bridge, built by Charles and [Edwin] Millar, on 3 December 1888. The official opening and hand over to the South Australian Railways Department occurred on 30 September 1889.

Conservation Assessment by Peter Dermoudy Sep 92

On May 11 1886 a contract was signed between the SA Railway Commission and Millar Bros of Melbourne to contract a 145.5 miles, 3 foot 6 inch gauge railway line from Palmerston to Pine Creek – termed the Palmerston and Pine Creek Line. The contract price had been negotiated with the use of ‘coolie labour’ – some 2970 Indian and Chinese men were to work on the railway. Earthworks were undertaken by Indian coolies. They were closely followed by Chinese plate-laying gangs. All work stopped in November 1887 with the onset of the Wet Season, just six miles north of Adelaide River and resumed on 18 April 1888 – the river was reached by the end of the month. Bridges were constructed by sub-contractors and the Adelaide River provided the biggest challenge yet. It was five spans, each of 100 feet and 54 feet above the riverbed.

J.Y. Harvey in *The Never Never Line* stated:

“The bridge site hummed with activity. At ground level small gangs of coolies could be seen sinking the deep foundation shafts, digging their way through the rich alluvial soil until they found bedrock. Before they could move on to the next shaft they had to level the bottom. The foundation builders then moved in and lowered the heavy cast-iron cylinders, section by section, into the open shafts. Once placed and accurately plumbed the cylinders were filled with concrete and the earth around them backfilled.

One hundred feet back towards the north bank another gang was busy erecting the bridge piers (twin iron columns braced with iron straps). Perched on their spindly scaffolding the gang laboured to position the heavy tubes. After a final check for alignment and verticality the tubes could be braced and filled with concrete.

Next came the skilled artisans whose task it was to erect large open web girders, two of which formed the main spans. Working from a temporary wooden bridge the riggers assembled and riveted the multiplicity of bits and pieces to finally fabricate the girders. Once they were in place and resting on their bearings it was time to fix the cross members (or transoms) in readiness for the decking, sleepers and rails. The bridge project demanded a sizeable work force utilising Europeans and coolies, skilled and unskilled, all toiling as a coordinated team.”

A Mr Goss, who worked on the Overland Telegraph Line and was stationed at Adelaide River in 1888, had this to say of the bridge workers:

“They were a tough crowd, but they were good men, and the firm cast a tolerant eye on their little lapses, which mostly occurred once a fortnight and directly after pay days, and for a few days there was no lack of entertainment to any who were not too fastidious in their tastes for amusement”.

Mr Goss also provided an interesting picture of the temporary bridge which was needed to get construction material over the river:

“It was ‘a very shaky and primitive affair’ and the driver of the construction train employed all means at his disposal to get across and up the steep bank on the other side..... when within a mile or so of the river, speed was increased and the train came thundering down the bank, staggered across the quivering bridge, trusting to speed and impetus to help him up the opposite bank it was generally a touch and go job”.

The first train hauled by a W36 Beyer Peacock engine arrived at Adelaide River on 16 July 1888. The journey from Palmerston (Darwin) had taken five hours.

*Compiled by Penny Cook and David Carment
Research by Helen Wilson*

Period of Operation:

The first scheduled train crossed the bridge on 8 December 1888.

In late 1941 or early 1942, the bridge was decked with longitudinal timbers and sealed access tracks to permit single lane road traffic during wet season flooding of the low level road crossing.

A \$600,000 major upgrading of the now Darwin to Birdum Railway (North Australia Railway) was announced by the current operators, Commonwealth Railways, in August 1952. This entailed a structural upgrading of the bridge which included additional lateral bracing to the lattice trusses in the form of braces taken from the cantilevered ends of additional steel transoms.

Conservation Assessment by Peter Dermoudy Sep 92

After the war, the North Australian Railway steadily declined. The 'mixed train' continued to run a weekly service but with the introduction of diesel the timetables changed – by 1958 the train only stopped at Adelaide River from 10.26pm to 10.36pm.

*Compiled by Penny Cook and David Carment
Research by Helen Wilson*

A further upgrade occurred in 1967 due to a proposal to transport iron ore from Frances Creek (just north of Pine Creek) to the Port of Darwin for export. This involved heavier loads than the railway was designed for. The track was upgraded to 80lb/yard rail and bridges were strengthened. The rail for the upgrade came from the Transcontinental Railway Line and is stamped "Tennessee 1913".

There were several blows for the NAR in its final years. It is thought that the Frances Creek Mining Company fell behind on its payments for the transport of iron ore; then in November 1972 there was a major train crash in the Darwin railway yards involving a runaway iron ore train. There was considerable damage to locomotives, rolling stock and track. The estimated cost of this accident was \$1 million. Then Cyclone Tracy inflicted further damage in 1974.

The last revenue train to rumble over the bridge did so on 30 June 1976 when the NAR closed for business. Road traffic continued to utilise the bridge for wet season access until the opening of the Edwin Verburg Bridge on 27 March 1980.

Conservation Assessment by Peter Dermoudy Sep 92

Construction Contracts:

Responsibility for overall construction of the railway from Darwin to Pine Creek was clearly with the company of Charles and Edwin Millar, Melbourne, Victoria.

Fabrication of the steelwork for the Adelaide River Bridge was carried out by James Martin, Gawler, South Australia. It is thought that the contract for the fabrication of the bridge was between Martin and the SAR (South Australian Railways) with the SAR supplying the bridge components to the railway construction contractor. There is no clear evidence that the Millars constructed the bridge however this is the assumption which has been used in the absence of any other evidence.

It is also possible, as some references suggest, that some components, particularly the cast iron columns for the bridge support piers, might have been imported. No clear evidence of this exists. Furthermore there is evidence that at some time James Martin did operate a foundry.

The only product identification seen on the structure of the bridge is the markings LANARKSHIRE STEEL COY. LTD. on the rolled steel sections used for the later additional transoms and lateral braces added in 1952 or 1967. This marking only indicates the manufacturer of the steel. It is not clear who constructed these works.

Sequence of Upgrades of the Bridge:

There is some uncertainty about upgrades to the structure of the bridge and the track during its working life. It is clear that additional transoms and lateral bracing were added at some time after the original construction. References indicate two dates when this work could have occurred – 1952 or 1967. Several references have been consulted without totally clarifying this point.

The evidence in favour of the original date includes a very specific reference and the fact that it seems increasingly unlikely that Scottish steel would have been imported for the work the later the work was carried out. In 1952 it is known that Australian steel supply was still limited following wartime restrictions and the building boom which followed the war. This could have forced a contractor to source steel from overseas.

The evidence in favour of the 1967 date is primarily that there was a known rationale for an upgrade at that time – the commencement of the carrying of iron ore from Frances Creek. On the other hand it is much less likely that steel for the work would have been imported at this date.

In this document it has been assumed that the strengthening of the bridge was carried out in 1952 and that the upgrade of the track to 80 lb/yard rail occurred in 1967. Later evidence may render this assumption incorrect.

Physical Condition:

The bridge is generally in good condition however the following items were required when the bridge was surveyed in March 2002.

Bottom Chord Cleaning Out. The five 100ft spans of the bridge each have ten modules each of ten feet length. Hence there are 20 “water isolated” sections of the bottom chord in each span, making 100 such sections all together. [There are drain holes in these areas.] Some of them are draining but most are not. As a minimum, the drain holes need to be cleared and the bulk rubbish cleaned out. This could be done by hand (with a screwdriver etc.) [This work has subsequently been carried out].

Support Bearings. At the pylons, the bridge seems to slide lengthwise in guides. They seem fairly clear but short on lubrication. Bearings may need to be serviced.

Safety Fencing. At some stage the bridge has been fitted with Pig Wire fencing along each side and this needs tidying up.

Fettlers Refuges. There are eight small refuges for fettlers caught on the bridge when a train comes, a couple of which may need some minor straightening.

Protective Paint. The protective paint has gone in many areas of the superstructure, possibly due to the intense fire from the burning wooden railway sleepers.

Trevor Horman 24 March 2002

Report from Peter Dermoudy from several years ago estimates \$94,000 to professionally paint the bridge.

Trevor Horman 18 March 2002

The old paint is probably red-lead meaning Occupational Health and Safety issues may be raised in touching the existing paintwork.

George Curran 18 March 2002

Apart from the wooden components of decking and sleepers which have suffered the ravages of fire and dry rot and can be considered to be nonexistent, the metal structural component is currently in excellent condition despite its corrosion prevention system of paintwork which has entered a state of major decline.

It is obvious that no maintenance painting of the ironwork has been carried out since before NAR closed for business in 1976 and the ravages of weather and fire on the basic structure are beginning to show. Horizontal exposed surfaces are almost entirely devoid of paint but show little or no signs of rust. Surprisingly, the only noticeable powder surface rust is on the under side of the top chord, out of the weather, between the two plate webs and in the same location on the bottom chord due to water entrapment.

In its present condition the bridge is under little natural threat, perhaps the greatest being bushfire which could accelerate degradation of existing and future paintwork.

Conservation Assessment by Peter Dermoudy September 1992

Engineering Heritage Significance:

The education aspect of this style of bridge is immense. It is a significant and lone example of its type (in the Northern Territory) and illustrates careful and skilled design applied to a structure which had to be prefabricated and then transported over thousands of kilometres to a remote site away from significant skilled labour and engineering resources. The care taken over the profiled shape of the transoms is indicative of this finesse along with the choice of weight saving truss construction.

Conservation Assessment by Peter Dermoudy September 1992

The bridge is constructed using materials and methods which have long since been superseded. The construction of the steel trusses using structural sections fabricated from simple rolled sections and flat plate and all connected with rivets has long-since been replaced by construction using heavy rolled steel sections, welded construction or even concrete beam construction. The cast iron piers would be constructed of concrete or welded steel in modern practice.

The survival of this bridge, particularly considering its good physical condition provides a valuable insight into older construction techniques as well as representing a significant item of heritage representing an important period of Northern Territory development.

Technological/Scientific Value:

The bridge design contains two features of great value in charting the changes which have occurred over more than a century in structural engineering. The fact that these features have been preserved in this bridge provides a significant opportunity to compare technological solutions in the past with those now used.

Fully Riveted Construction. Most of the connections in the bridge were constructed with hot-formed steel rivets. As noted on the drawings these were predominantly ¾" diameter. Riveting was

the normal method of connection at the time of construction of this bridge. Electric welding was not developed as an industrial process until well into the first half of the twentieth century.

In this case much of the riveting would have been carried out in the factory and transported to the site as prefabricated sections. This particularly applies to the more complex fabricated sections in the larger members such as the upper and lower chords of the main trusses.

Further riveting would have been carried out on site to join the prefabricated components together to form the larger elements of the structure.

Riveting is a skilled trade requiring a team of workers. The rivets were heated to incandescent heat then quickly handed or thrown up by the 'rivet boy' to the 'holder up' who placed the rivet in the hole and applied a holding up device so that the 'riveter', working on the other end of the rivet could 'close' it with a pneumatic hammer. This required a closely co-ordinated operation requiring several workers depending on the distance from the rivet-heating forge to the riveter. The operation was particularly difficult on tall structures such as towers and large bridges. The rivet had to be 'closed' tightly so that when it cooled there was tension in the rivet to hold the faces being riveted tightly together for a strong and robust joint.

These skills have largely disappeared from the steel-working community although riveted construction, using much smaller alloy rivets is still used widely in the aircraft industry.

Cast Iron Piers. At the time that the Adelaide River Railway Bridge was constructed cast iron was still widely used as a structural material in many industries. The material was ideal for bridge piers where the loads are largely compressive and durability is a prime consideration, particularly where the pier enters water or the ground. Cast iron is very strong in compression and is highly resistant to corrosion.

The main drivers for the move away from cast iron as a structural material were its great weight and the high skill levels involved in making patterns for casting and the actual casting process.

It should also be noted from the drawings that machining of mating surfaces was required at the joints between the cast iron sections of the piers, each one of which was 6 feet long and 3 feet 6 inches in diameter. Machine tools of considerable size would have been required to carry out this work and there would be no room for error. The machining would have been carried out in the factory and no machinery able to make any field adjustments to the inside or outside diameters of the numerous sockets connections on the piers would have been available in the Northern Territory.

The piers were filled with rubble concrete up as far as the ground line.

Historical Value:

The position and alignment of Adelaide River Railway Bridge was determined during the survey of the Palmerston and Pine Creek Line in 1884. ... Adelaide River became after 1941 a most important military base. A major reason for this was the existence of the railway, which after the bombing of Darwin provided a supply line to replace the precarious sea link. The whole line had to be reballasted to support the enormous increase in traffic – eight times greater in 1941/42 than 1938/39.

*Compiled by Penny Cook and David Carment
Research by Helen Wilson*

The importance of the Adelaide River Railway Bridge to the operation of the NAR was recognised by the military during Second World War. Although a considerable distance inland damage to the bridge by enemy bombing was possible. Hence almost all critical depots to supply Darwin were

constructed north of this bridge. Although there was an intense military presence in Adelaide River area the vast majority of it was on the Darwin side of the river.

Early in 1942 the North Australian Railway Line was divided into four strategic districts so that locomotives and rolling stock could be effectively dispersed. Adelaide River became the 'rear echelon' of an operational area. A large ordnance depot and supply complex with refrigerated stores, an abattoir, rations, clothing and engineers stores was set up, defended by infantry and artillery units. Concrete block houses covered the approach road and the strategically important railway bridge. Storage and supply depots were situated on two spur lines to the north of the town. The railway yards were extended to provide a siding for the hospital train and an additional locomotive siding and a large military hospital was constructed to the south of the river. The railway bridge had longitudinal timber decking laid between and on either side of the rails so that it could be used to cross the river when the low level road bridge was cut during the wet season.

*Compiled by Penny Cook and David Carment
Research by Helen Wilson*

Social Value:

The bridge is located in a very prominent position close to the Stuart Highway and is arguably the most imposing structure in the Adelaide River Township. It is also located close to the Adelaide River Railway Station Precinct which is one of the two major tourist sites of interest in the township – the other being the Adelaide River War Cemetery.

The bridge has social context with almost all the major events which have involved Adelaide River and the 'communications artery' represented by the Stuart Highway. The township and its major events are closely intertwined with the history of the Stuart Highway.

The building of the Overland Telegraph was perhaps the first event. This led to the discovery of gold in the Pine Creek area and the subsequent Gold Rush. The railway was built first in response to the gold rush then extended to Katherine and ultimately Birdum to serve the pastoral industry and the tin mines at Maranboy, south of Katherine. During this period the line was seen as the beginning of a north/south transcontinental line however the cessation of construction during the Depression put an end to this dream until the latter years of the twentieth century. All these events impacted on the township of Adelaide River, if only because trains stopped at Adelaide River so that passengers and crews could eat and rest. The railway opened up vast tracts of country and allowed many activities to commence and prosper.

When the Second World War came, Adelaide River township became one of the first locations south of Darwin reasonably protected, by virtue of its distance from the coast, from air raids. It became a major military area and the railway played a vital role in communications north to Darwin and south to the rest of the country. The need for further improvement in communications led to the construction of the Stuart Highway to sealed condition from Darwin to the railhead at Alice Springs. Again Adelaide River township was involved as one of the key stopping places along the highway.

In the post-war era the 'communications corridor' represented by the North Australian Railway and the Stuart Highway was expanded to include other assets. Microwave replaced the copper wires of the Overland Telegraph, in the early 1970's electricity lines reached Adelaide River from Darwin, in the 1980's the Amadeus Basin to Darwin gas pipeline passed close to the township, a 132 kV transmission line was built from Darwin to Katherine which passed through the township and the microwave was augmented by a fibre optic cable.

Each of these additions to the 'communications corridor' which ran through Adelaide River brought change, activity and excitement to the little township. These changes were not transient as they were all part of a larger paradigm shift - the breaking down the "Tyranny of Distance" in the outback and Adelaide River was part of that shift.

Today we casually punch the cruise control off as we drive into Adelaide River - not just because the local policeman has a reputation for keeping a close eye on speed in the township - but also because this is a place where so much of social interest has happened over the last five generations. The little town compels one to stop and think about what has happened there. The old bridge is a powerful metaphor for the social changes that the people of Adelaide River and of the Northern Territory have seen.

Landscape or Townscape Value:

The railway bridge is a prominent landmark in the township. Residents can hardly forget its presence and passers-by cannot help but notice it as they pass over one of the four parallel bridges that cross the Adelaide River at this point. The four bridges are (from the eastern or downstream end) the low level bridge of the old Stuart Highway which probably dates from the Second World War; the new Edwin Verburg highway bridge commissioned in 1980; the brand new Alice Springs to Darwin Railway bridge and the old NAR bridge. Of the four bridges it is the old Railway Bridge which stands out as the dominant structure with its high steel trusses. For those who appreciate bridges it is even more impressive as it contains details of design and construction which are more sophisticated and appealing than the slab-like masses of the other bridges.

Rarity:

The design of the bridge is by no means unique nor is it rare for bridges to survive for over one hundred years. It represents best practice from an era when things were "built to last" and it has passed the test of longevity with flying colours.

Its rarity lies primarily in the events with which it has been associated and the never-ending struggle to conquer distance for which it stands as an enduring symbol.

Representativeness:

The bridge is strongly representative of its era and the mission of the British Empire at that time to span the great colonies of the Empire with steel rails. It represents an era when British meant best and when no one was surprised by the audacity of colonial ambitions to carry out great works and open up new country.

John McDouall Stuart has crossed the continent from south to north for the first time only 20 years before the construction of the Overland Telegraph. The Overland Telegraph, which connected Adelaide to London for the first time, was built 14 years before the NAR. When the NAR was built it was intended to be a north/south transcontinental line. This was an era of big dreams.

In this respect it is in powerful contrast to its newest neighbour – the bridge of the Alice Springs to Darwin Railway yet there are similarities of motive.

This later railway building enterprise represents a powerful imperative to develop the Northern Territory for Territorians and Australia for Australians. As a nation we are no longer subservient to the British Realm. The two bridges, built side-by-side, 115 years apart, represent the great changes that have occurred in Australian society over that gulf of time. The new railway is not about nation building but is all about economic efficiency.

Contribution to the Nation and the Region:

The bridge made a significant contribution to the Nation in terms of being an essential part of a railway system which facilitated the development of a vast tract of country south of Darwin

including the mining precincts of Pine Creek and Maranboy and the pastoral areas of the Victoria River District and the Barkly Tablelands.

The contribution of the North Australia Railway during the Second World War in assisting the Allied War Effort was very significant. The southern limit of Japanese air superiority crossed the fragile tracks of the North Australia Railway somewhere between Darwin and Adelaide River.

The developmental influence of the North Australian Railway was less pivotal after the Second World War as the Stuart Highway had been sealed between Darwin and Alice Springs. Nevertheless it remained an important transport link for the small towns along its route from Darwin to the railhead at Larrimah including Adelaide River. The last major role for the North Australian Railway was the transport of iron ore from Frances Creek Mine near Pine Creek to the Port of Darwin for export.

Contribution to Engineering:

The installation does not have any unique design characteristics or features of an unusual engineering nature. It represents 'good current practice' for its time. It was intended to be a reliable, simple, work-a-day installation requiring a minimum of maintenance. The lack of 'fanciness' or 'innovation' marks it as achieving its purpose – a long lasting engineering solution to a particular set of circumstances.

Persons Associated with the Work:

H. C. Mais He was Engineer-in-Chief of the South Australian Railways Department. He was responsible for the design of the bridge in the period September 1884 to June 1885 and his signature appears on the original drawings dated "1/8/85".

Mr Mais was in the position of Engineer-in-Chief as early as 1874 according to an article by Peter Kay in his paper British Signalling Overseas – No.2 – South Australia. He states that "In 1874 when the SAR [South Australian Railways] Engineer-in-Chief H.C. Mais introduced block working on some of the busier double lines in the Adelaide area. For this he chose, of all things, Spagnoletti blocks".

In 1878 Mais despatched survey teams to the Northern Territory to do preliminary surveys for the proposed Palmerston to Pine Creek railway. This information was used to compile his report on the railway to the SA Parliament during debate on the legislation in 1879. Mais estimated that the cost of the railway would be £1,113,671, excluding the cost of the five largest bridges. One bridge over the gorge of the Adelaide River was estimated to cost £160,000.

Mais was involved in the evaluation of the many pioneer railways of the day including the Peterborough to Broken Hill Railway and the North Australian Railway. For the NAR he had to decide on the gauge, the type of rail (flat bottom) and the weight of the track (41lb/yd). In view of the long lead-time he ordered the 10,000 ton of rails from Krupp in Germany in 1885 and the pressed steel sleepers from Ibbotson Brothers of the United Kingdom. The whole consignment was shipped to Port Darwin.

Charles and Edwin Millar They were the principals of Millar Bros of Melbourne who won the contract to build the railway from Palmerston to Pine Creek. The contract is dated 11 May 1886.

Charles Gibson Millar was born in 1839 and died in 1900 at the age of 61 years. Edwin Franks Millar was born in 1844 and died in 1928 at the age of 84 years. There were five other children in the

family, four girls and one boy all born between 1836 and 1850. John Millar, their father, was an engineer.

Charles and Edwin first came to Australia from Ireland with their parents in the late 1850's and stayed for a few years. The family gained significant wealth working on the goldfields. They returned to Dublin where they went to university to complete engineering courses. The family then returned to Australia and settled in Melbourne. The brothers formed a company known as C and E Millar Trading Company. They secured many important engineering contracts, including bridges in Melbourne and Sydney, one of which was the Hawkesbury River Bridge.

In 1863, when Charles was twenty two, he married Elizabeth Kenny who was then aged seventeen. Charles and Elizabeth had four children between 1864 and 1870. Elizabeth died in 1870 giving birth to their only son, Charles Ravoli Millar who also died at birth. Charles later remarried. By this time Edwin was also married to Bowes Kelly.

During these years the business partnership of Charles and Edwin flourished. They obtained contracts for railways between Shepparton and Numerkah, Hawthorn and Lilydale and Tallarook to Yea, all in Victoria. They also formed the Karri and Jarrah Timber Mills Company at Mount Barker in Western Australia. In 1884 they expanded their timber interests to Denmark 414 km south of Perth and in 1894 to Yarloop 125 km south of Perth. Their timber interests in Western Australia continued to grow and by the 1930's the company owned and operated the largest private railway network in the world with eight railways and 25 locomotives. They established their main workshops at Yarloop and employed 500 people in the town which was virtually a company town. The Yarloop workshops have been preserved and are now a National Trust classified property.

The brothers grew rich and influential. Charles owned two luxury yachts and was a personal friend of King Edward VII of England and the Kaiser of Germany. Charles owned estates in most Australian states and in London.

Charles died of angina on his yacht "White Heather" at Las Palmas in the Canary Islands in 1900 while returning to Melbourne.

John Ringland Anderson, Family History of Charles and Edwin Millar, "Koorabup" No. 15, Denmark WA.

James Martin. James Martin was the owner of the enterprise thought to have fabricated the components for the Adelaide River Bridge at Gawler, South Australia. He was born on 23 April 1821 in Cornwall and arrived at Gawler in 1847.

He started an engineering company in 1848 and it boomed making farm implements, bridges and locomotives. The staff peaked at 700 men. James died on 23 December 1899 and the business was already in decline with recession and the South Australian Railways making their own locomotives at Islington. He also started a foundry but it failed.

The Chinese and Indian Coolies. The Millar's used Chinese and Indian coolies extensively in the construction of the railway. In the Northern Territory there were already Chinese immigrants working on the goldfields of Pine Creek where the rush started in 1872/3. The first 186 Chinese workers were brought from Singapore in 1874 and packed off to the goldfields. They were hard working and enterprising. In mid 1876 there were 259 Europeans and 97 Chinese on the fields. By 1879 Europeans were outnumbered by 7 to 1.

By 1881 the number of Chinese in the Northern Territory had grown to 3804 and a decade later the number was 3613. Whilst the numbers gradually decreased until 1921 when there were only 722 Chinese in the Northern Territory they had also become permanent residents. Their descendants are

still very visible, and very influential in the Northern Territory community, having held many important community positions over the years.

At about the time that the bridge was being built sensitivity to immigrants was rising in the more populous colonies of what were to become Australia at Federation in 1901. Australia would come into existence with what became known as the "White Australia Policy". A large part of the following century was taken up with overturning the White Australia Policy and recognising the great contribution which had been made by our immigrants to both the development of the nation and the culture of the nation. It was not until the Hawke and Keating Labor governments in the 1980's and early 1990's that a Multicultural Australia was broadly accepted in the legislatures and in the suburbs.

The Northern Territory had resisted the White Australia Policy and, as was so often the case, went against the flow of what was happening in the "south". The repressive laws of the late nineteenth century were simply ignored in the Northern Territory. The Chinese remained and remain to this day. Following Federation the White Australia was largely irrelevant in the Northern Territory. By the late twentieth century we would have been shocked to find anything but a broad mix of races in the classrooms of our schools and in our community in general. And the Chinese were a significant part of this mix as they had such a long and successful history as immigrants in the Northern Territory.

By the late twentieth century the concept of a Multicultural Society was so entrenched, particularly in Darwin, that the little city became famous around the world for its racial tolerance and harmony in a world that was struggling to find such tolerance and harmony.

When, in the early years of the twenty first century the Government in Canberra adopted draconian measures to deal with refugees from Afghanistan and Iraq it was no surprise that Territorians were vocal in their protests to Canberra. After all it was Afghans who carried the first heavy loads on their trusty camels along the track that eventually became the Stuart Highway, but is still called "The Track" by Territorians. The Afghan camel drivers (whose descendants still live in Alice Springs) supplied the working parties for the Overland Telegraph before the luxury of a railway or bitumen highway was contemplated. The Canberra Politicians had forgotten our national history and why the passenger train which now runs between Adelaide and Alice Springs (and will soon be extended to Darwin when the new railway is commissioned) is called "The Ghan". Territorians had to remind them with some force.

Integrity:

The structure is remarkably good condition and the steelwork is not demonstrating many signs of problems. The structure has been strengthened at one stage of its life (thought to be 1952) by the addition of: -

- a) an extra RSJ transom beneath each riveted transom
- b) additional lateral braces to the top chord of the trusses, and
- c) duplication of the wind bracing in the plane of the deck

The bridge carries several water pipes, a couple of which might be now disused and could be removed entirely.

George Curran 28 August 2001

Authenticity:

The structure of the bridge as originally built is virtually all intact. There have been some additions however these are part of the evolving use of the bridge and care will need to be taken in deciding if any of these additions should be removed to return the bridge to its original as-constructed condition. There were structural modifications in 1952 involving the addition of transoms, lateral bracing and

wind bracing to the structure. An interesting feature of these modifications, which are far less refined than the original construction, is that the steel for the work was manufactured by Lanarkshire Steel Coy. Ltd.

The second modification is the addition of several water mains either laying on the bridge deck or on outriggers. Some of these pipes are now no longer in use and authenticity would be enhanced if they were removed. The timing of addition of the various pipes is not clear.

There are four water pipes across the bridge. There is a four inch (100mm) galvanised steel pipe on each outrigger [outside the trusses]. They may both be in service, but the western one has multiple pinhole leaks and is not long for this life. The eastern one may be out of service already. Neither of them is a problem to the bridge or the NAR railway and represents common usage of bridges for such purposes.

There is a six inch (150mm) galvanised steel pipe between the main girders, which is very broken and is definitely out of service. It should and could be removed.

The real problem is relatively new 200mm steel main which is wrapped in bitumen. It would have been installed after the Verburg Bridge was opened and possibly it was 1984. It is the main supply in to town. It is adjacent to the 3'6" railway line and is an impediment to recommissioning the railway and is also very untypical of the way joint use of bridges is practised.

Trevor Horman 16 May 2003

Comparable Works:

There were two other large steel girder bridges on the North Australian Railway.

The other later bridges are at the Fergusson and Katherine Rivers. The Fergusson River bridge at Pine Creek [south of Pine Creek], 1917, has deck-type girders with spans of 18.3, three at 30.5 and 18.3 m. In the 1928 Katherine River bridge the girders are half-through, and there are seven 30.5 m spans.

Spanning Two Centuries – Historic Bridges of Australia, Colin O'Connor, 1985

It should be noted that the Fergusson and Katherine River bridges are of plate girder construction unlike the Adelaide River lattice girder type.

A bridge of very similar construction was constructed in 1891 at Algebuckina in South Australia and it is thought that this bridge was also fabricated by James Martin who fabricated the Adelaide River Bridge. In fact the truss designs and spans at Algebuckina are so similar to those at Adelaide River that they may have been built to the same design. The Algebuckina Bridge is, however, much longer having 19 spans compared to the 5 at Adelaide River.

The difficulty of transporting and erecting the Adelaide River Bridge cannot be over-stressed. The bridge components would first have been transported by road or rail from Gawler to Port Adelaide for loading onto one or more ships. There is no known record of the ships used. They could have been sailing ships at the time or steam powered vessels. In either case they would have been quite slow and the journey from Port Adelaide to Port Darwin (approximately 6000km via the west coast) would have taken at least one month. On arrival at Port Darwin the bridge components would have had to be unloaded with very crude lifting equipment and placed onto railway wagons for the journey over the partially completed line to Adelaide River.

Once at Adelaide River the components would have had to be unloaded again with crude lifting gear and assembled. The construction methodology has not been documented and there are no

photographs known of the bridge during structural assembly. Sub components may have been riveted together prior to raising them to their final position. Alternatively components as-delivered could have been raised onto falsework and assembled by riveting. It is clear that this work would have been demanding, dangerous and time-consuming for the contractor as the capacity of cranes available at that time was limited in comparison to modern practice.

The transport, handling and assembly of the eight cast iron columns which make up the intermediate support piers of the bridge would also have been difficult. Each 6 foot section of the columns would have weighed over 1.7 tonnes.

Materials such as cement for the concrete used in the foundations and abutments would have been imported from England or from the southern states in barrels.

The hiring, transportation and accommodation of skilled tradesmen such as riveters would have involved considerable logistical problems. Almost no local resources except for aggregate and sand would have been available and the supply lines for any additional materials required, special tools required and repair materials for any damage or errors encountered would have been extremely long. At least the constructors had access to the Overland Telegraph for communications with the outside world.

Proposed Mounting of the Plaque:

Two alternative methods of mounting of the plaque have been considered and no decision has been made on which to adopt.

Separate Concrete Mounting Block. This involves construction of a concrete plinth with its long axis parallel to the railway lines and mounted far enough from the tracks to be clear of train movements. This would be located as close behind the south abutment as possible probably on the upstream side as there is less clutter of water pipes on this side. The structure would need to be massive enough to resist vandalism and high enough to mount the plaque at a height which would enable easy reading of it. The plaque would be mounted on a vertical (or near-vertical) surface facing the tracks. Whilst this method involves considerable construction it has no impact on the existing bridge structure and allows train running in the future.

Mounted on End of Main Truss. It is not considered appropriate to drill new holes in the plate-work of the end column of one of the main trusses although a flat steel surface 1' 9" (533 mm) wide is available. This proposal envisages a welded and bolted steel-mounting frame to enclose the truss end column at a height appropriate for convenient reading. The frame would be fabricated off-site as far as possible then bolted in place. The bolts would then be seal-welded in-situ for security. The plaque would be attached to this structure prior to fitting so that the attachment bolts would be captive for security.

This proposal avoids damage to the bridge, avoids a new structure and presents the plaque head-on to a viewer approaching the bridge along the railway track from the south.

Attachments to Submission:

Letter of Approval from owner of bridge (AustralAsia Railway Corporation).
 Letter of Approval from owner of bridge (Asia Pacific Transport).
 Letter of Approval from Minister for the Environment and Heritage.
 Reproductions of Original Drawings of the bridge (4 sheets).
 Photographs from Australian Heritage Commission by J McKinnon.
 Photographs from NTLIS: Territory Images.
 Photographs taken by George Curran

Bibliography:

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 Ian R Stevenson
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 ISBN 0 7270 1029 8
- The Never-Never Line – The Story of the North Australia Railway
 J Y Harvey
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- Three Bridges – Railway Bridges at Adelaide River, Fergusson River and Katherine River –
 A Conservation Assessment for the Conservation Commission of the northern Territory
 Peter Dermoudy Heritage Consultant
 11/41 Duke Street, Darwin NT 0800
 GPO Box 1573 NT 0801
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- Tales from a Railway Odyssey (Volume 1) An Historical Autobiography
 Keith A Smith
 Railmac Publications 2001
 ISBN 1 86477 024 4 (hard cover), 1 86477 026 0 (soft cover)
- Landmarks in Public Works – Engineers and their works in New South Wales 1884-1914
 Edited by Lenore Coltheart and Don Fraser
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 ISBN 0 86806 296 0
- Former Wesleyan Church – 57 Knuckey Street, Darwin – Assessment of Objectives
 Miles Lewis
 May 1989
- South Australian Railways - Palmerston & Pine Creek Line – Bridge over River Adelaide at
 35 miles. 76.30 chs.
 Contract No. 25/85
 Drawing No.22, Sheets No.1 to 4
 1 August 1885
- Family history of Charles and Edwin Millar
 Written by Patricia Mary Conrad, transcribed by John Nairne Ringland Anderson
 Koorabup No.15 pp4-5
 Denmark Western Australia 6333
- Spanning Two Centuries – Historic Bridges of Australia
 Colin O'Connor
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 ISBN 0 7022 1798 0
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- How to Look at Bridges
Colin O'Connor
The Institution of Engineers, Australia and The Australian Heritage Commission
ISBN 0 85825 188 4
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Donald M Beaty
Perry Engineering and Clutterbuck Bros. 1989
ISBN 0 731 653 416



29 NOV 2002

MINISTER FOR THE ENVIRONMENT AND HERITAGE

PARLIAMENT HOUSE
STATE SQUARE
DARWIN NT 0800

GPO BOX 3146
DARWIN NT 0801
TELEPHONE: (08) 8901 4161
FACSIMILE: (08) 8901 4165

Ms Janice Lake
Director, Northern Division
Institution of Engineers, Australia
GPO Box 417
DARWIN NT 0801

Dear Ms Lake

I, Christopher Bruce Burns, having received comments from the Heritage Advisory Council and in accordance with section 39K of the *Heritage Conservation Act*, hereby authorise the installation of commemorative plaques at the Steam Pump House, a declared heritage place located at Lot 5251, Town of Darwin, and at the Adelaide River Railway Bridge, located within Lot 194 (A), Town of Adelaide River; provided that the following conditions are met:

- (1) That all appropriate permits for access to the sites are received from the owners in writing prior to the installations proceeding;
- (2) That my Office of Environment and Heritage gives final approval for the text of the plaques prior to their installation;
- (3) That my Office of Environment and Heritage is notified of the start date of the works prior to their commencement; and
- (4) That my Office of Environment and Heritage is provided photographs depicting the plaques upon completion of the installation.

Please note that this permit constitutes relief from any potential prosecution under the terms of the *Heritage Conservation Act* 1991 only for the works specified. It does not provide any right or authority, directly or by implication, to enter land or access property to which the permit applies. Separate permits for access will be required as appropriate to the two subject sites.

Yours sincerely

CHRIS BURNS

25 NOV 2002



Northern Territory Government

3 APR 2002

www.asiapactrans.com.au

Asia Pacific
Transport Pty Ltd

ABN 13 082 501 942
186 Greenhill Road
Parkside SA 5063

GPO Box 2750
Adelaide SA 5001
Australia

Telephone
08 8301 1207

Facsimile
08 8301 1371

APT-D08.04-L-01186-D

28 March 2002

Ms Janice Lake
Director, Northern Division
The Institute of Engineers, Australia
GPO Box 417
DARWIN NT 0801

Please address all return
correspondence to the
below address:

PO Box 38591
Winnellie NT 0821
Australia

Telephone
08 8922 4050

Facsimile
08 8922 4051

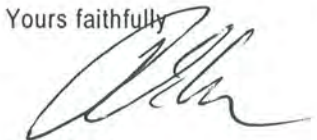
Dear Janice

AustralAsia Railway Project Australia Historic Engineering Markers Program

We acknowledge receipt of your correspondence of 23 March 2002 regarding the Adelaide River Bridge and wish to advise that providing there is no obligation from AustralAsia Railway Corporation then we also have no objection.

We will require to know the exact date and time this event is to take place and what the activities will be. We will then contact our legal representatives to determine what indemnities we will require from your institution.

Yours faithfully



R. E. Cush
Construction Superintendent

Copy : Franco Moretti – CEO, Asia Pacific Transport

Paul Astley – CFO, Asia Pacific Transport

Brendan Lawson – DCEO, AustralAsia Railway Corporation

Al Volpe – Project Director, ADrail

Nick Hutton - Willis

Asia Pacific Transport Pty Ltd is the nominee agent and trustee of and for the Asia Pacific Transport Joint Venture, an unincorporated joint venture between the following limited liability corporations whose liability is several:

Brown & Root Investments Pty Ltd
ACN 093 356 757

Brown & Root Investments (No. 1) Pty Ltd
ACN 096 323 278

Darwin Rail No. 1 Pty Ltd
ACN 094 737 443

Darwin Rail No. 3 Pty Limited
ACN 096 392 344

John Holland AD Investments Pty Ltd
ACN 092 661 044

JH Rail Investments Pty Ltd
ACN 096 330 700

Mackinnon Rail Investments Pty Ltd
ACN 092 390 746

Thomco (No. 2021) Pty Ltd
ACN 096 334 235

GWA Northern Pty Ltd
ACN 092 437 628

ARG Self Down No1 Pty Limited
ACN 096 337 861

S.A.N.T. (MGT-UJV) Pty Ltd
ACN 094 958 326

S.A.N.T. (TERM-UJV) Pty Ltd
ACN 094 958 344

Northern Railway Aboriginal
Investment Pty Limited
ACN 096 473 353

Central Railway Aboriginal
Investment Pty Limited
ACN 096 473 344

SIF Railway No. 1 Pty Limited
ACN 096 458 730

NAM NT Rail Pty Limited
ACN 096 446 874

Memax Pty Limited
ACN 096 451 802

Zelmax Pty Limited
ACN 096 451 848

Joetel Pty Limited
ACN 096 451 766

Nortfol Pty Limited
ACN 096 451 811

19 APR 2002



L2002-085

Janice Lake
Director, Northern Division
GPO Box 417
DARWIN NT 0801

Dear Janice,

RE: AustralAsia Railway Project – Australia Historic Engineering Markers Program

I refer to your letter dated 23 March 2002 to Asia Pacific Transport and copied to AustralAsia Railway Corporation (the 'Corporation')

We note that in its response, Asia Pacific Transport's does not raise any objection to the proposal providing there is no obligation from the Corporation.

The Corporation has no objection in principle to the Institution of Engineers' proposal to place an Historic Engineering Marker on the old Adelaide River Rail Bridge and also acknowledges that by its consent, Asia Pacific Transport' does not incur any additional obligation.

In not raising any objections in principle, the Corporation is assuming that in selecting the location for placement of the Historic Marker, the Institution of Engineers will duly consider the safety and amenity of those people who wish to view the site in the future, when the railway will be operational.

Yours sincerely,

A handwritten signature in black ink, appearing to be "Reg Walters", written over a horizontal line.

REG WALTERS

Technical Manager

8 April 2002

Copy: Franco Moretti - CEO, Asia Pacific Transport
Bob Cush - Construction Superintendant, Asia Pacific Transport
Paul Astley - CFO, Asia Pacific Transport
Al Volpe - Project Director, ADrail
Nick Hutton - Willis

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Email rail@aacrc.com.au
Website www.aarc.com.au

SOUTH AUSTRALIAN RAILWAYS.

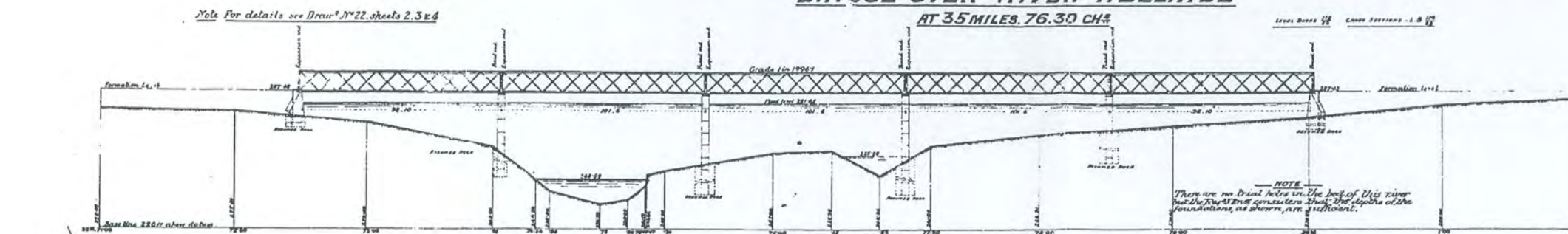
Division B PALMERSTON & PINE CREEK LINE

5 Gauge

DRAWING N°22
Sheet N° 1

BRIDGE OVER RIVER ADELAIDE

AT 35 MILES. 76.30 CH.

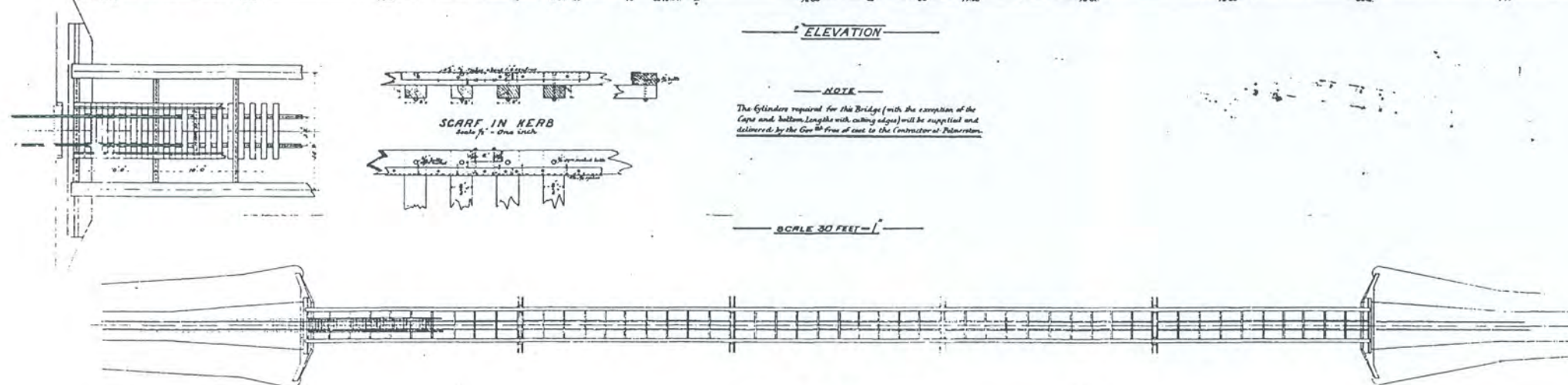


ELEVATION _____

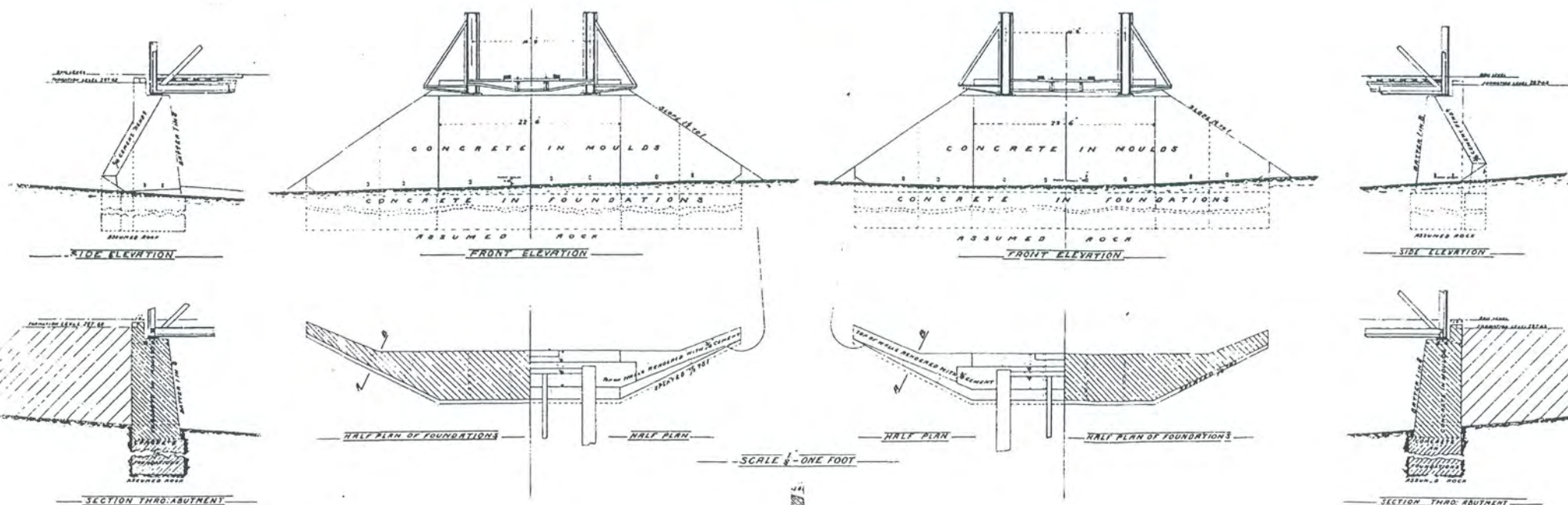
NOTA

The Cylinders required for this Bridge (with the exception of the Caps and Bottom Lengths with cutting edges) will be supplied and delivered by the Gov^{ts} free of cost to the Contractor at Palmerston

SCALE 30 FEET -



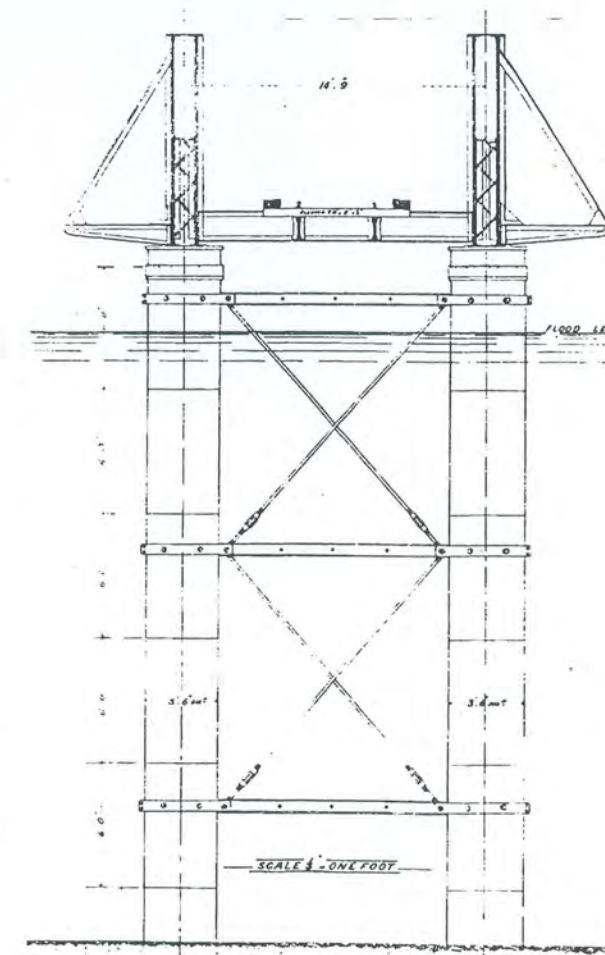
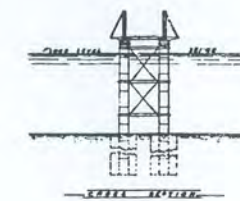
PLAN



ABUTMENT = PALMERSTON SID.

ABUTMENT - PINE CREEK SIL

H. L. Mail
Engineer in Chief



When entering the house, the first thing I noticed was the smell of smoke coming from the furnace. The furnace was in the basement and I had to go down to see what was wrong. I found the furnace was not working and the pilot light was out. I tried to relight it but it would not stay lit. I called a plumber and he came to the house. He said the furnace was old and needed to be replaced. He quoted me a price of \$1,200.00. I decided to have the furnace replaced. The plumber came back the next day and replaced the furnace. He also cleaned the ducts. The furnace is now working and the house is warm. I am very satisfied with the work the plumber did. He was professional and did a great job. I would recommend him to anyone who needs a plumber.

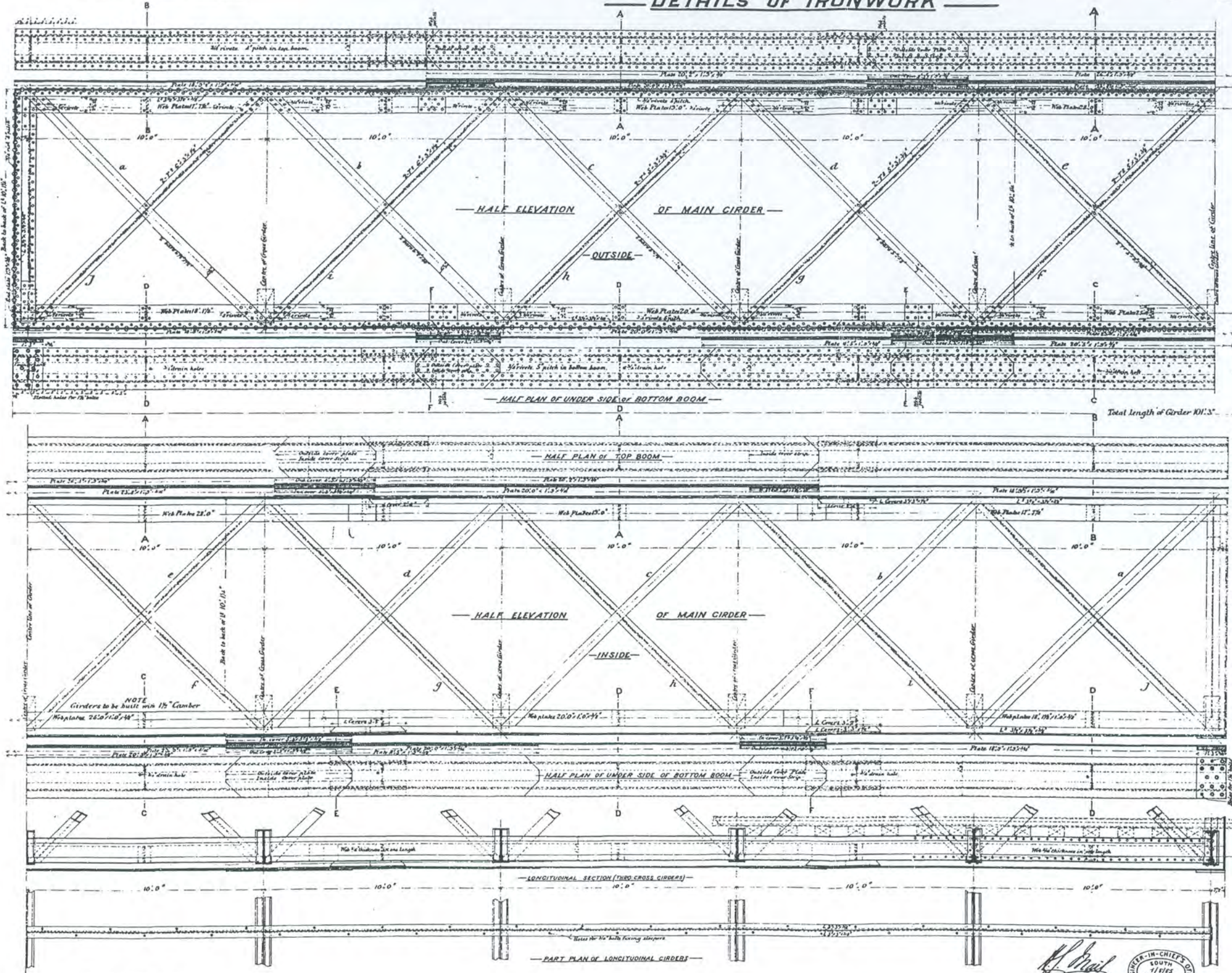
CONCRETE
IN
FOUNDATION.

CONCRETE IN FOUNDATION

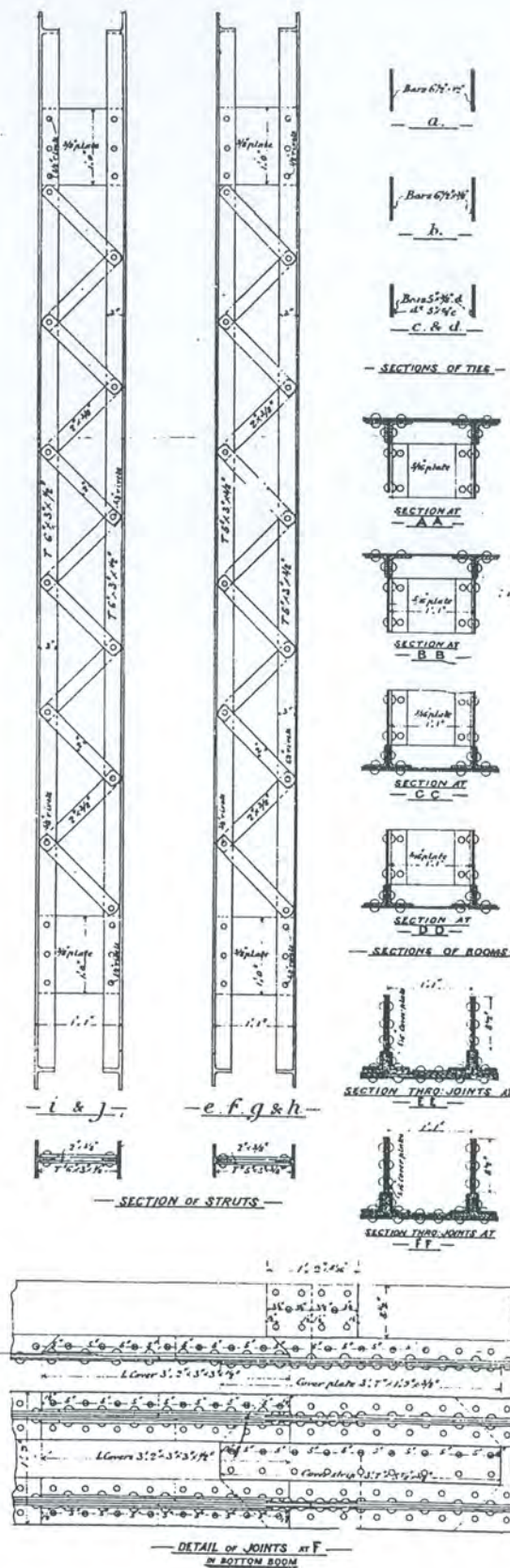
BRIDGE OVER RIVER ADELAIDE
— DETAILS OF IRONWORK —

Note: All rivets $\frac{3}{4}$ " dia' unless otherwise figured.

— General Scale 1/2" to the Foot —
— Scale for Enlarged Details 1" to the Foot. —



H. H. Hail
Engineer in Chief



DETAIL OF JOINTS AT F
IN BOTTOM BOOM

CONTRACT N° 85

SOUTH AUSTRALIAN RAILWAYS.

Division B

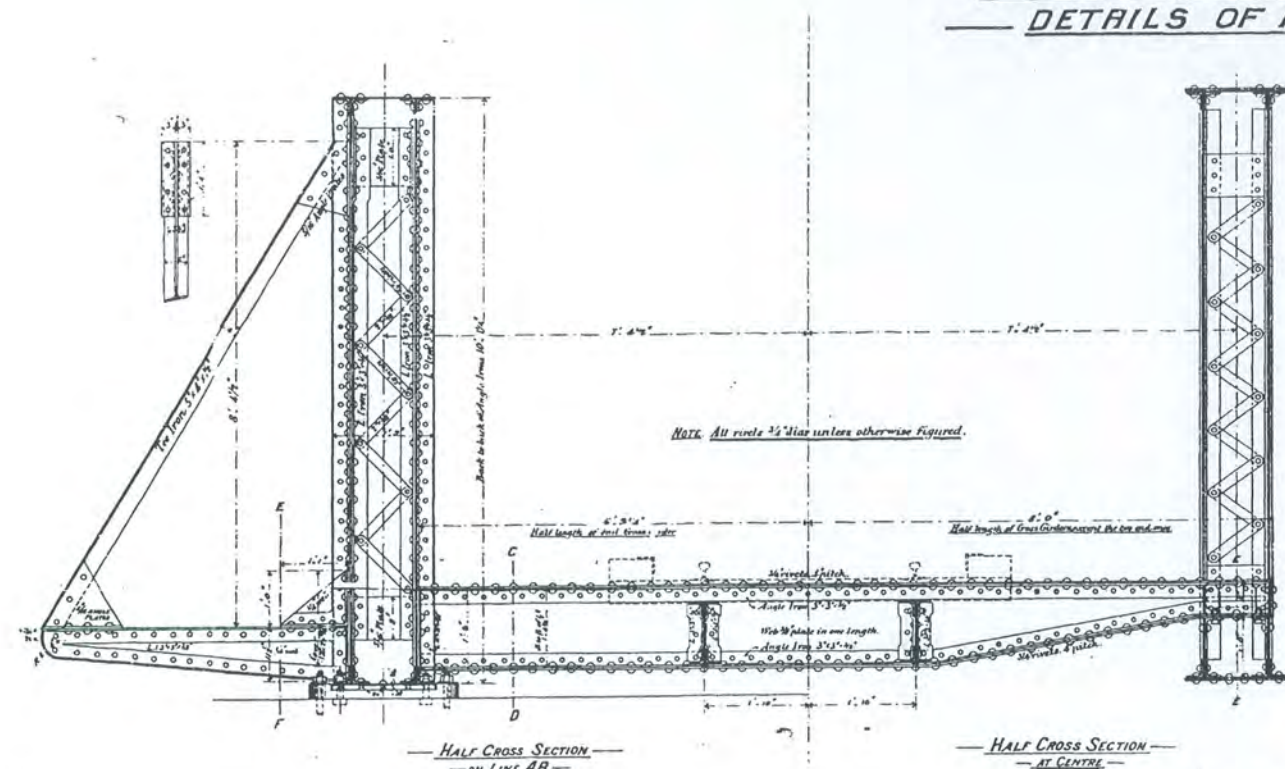
PALMERSTON & PINE CREEK LINE 3.6 Gauge

BRIDGE OVER RIVER ADELAIDE

DETAILS OF IRONWORK

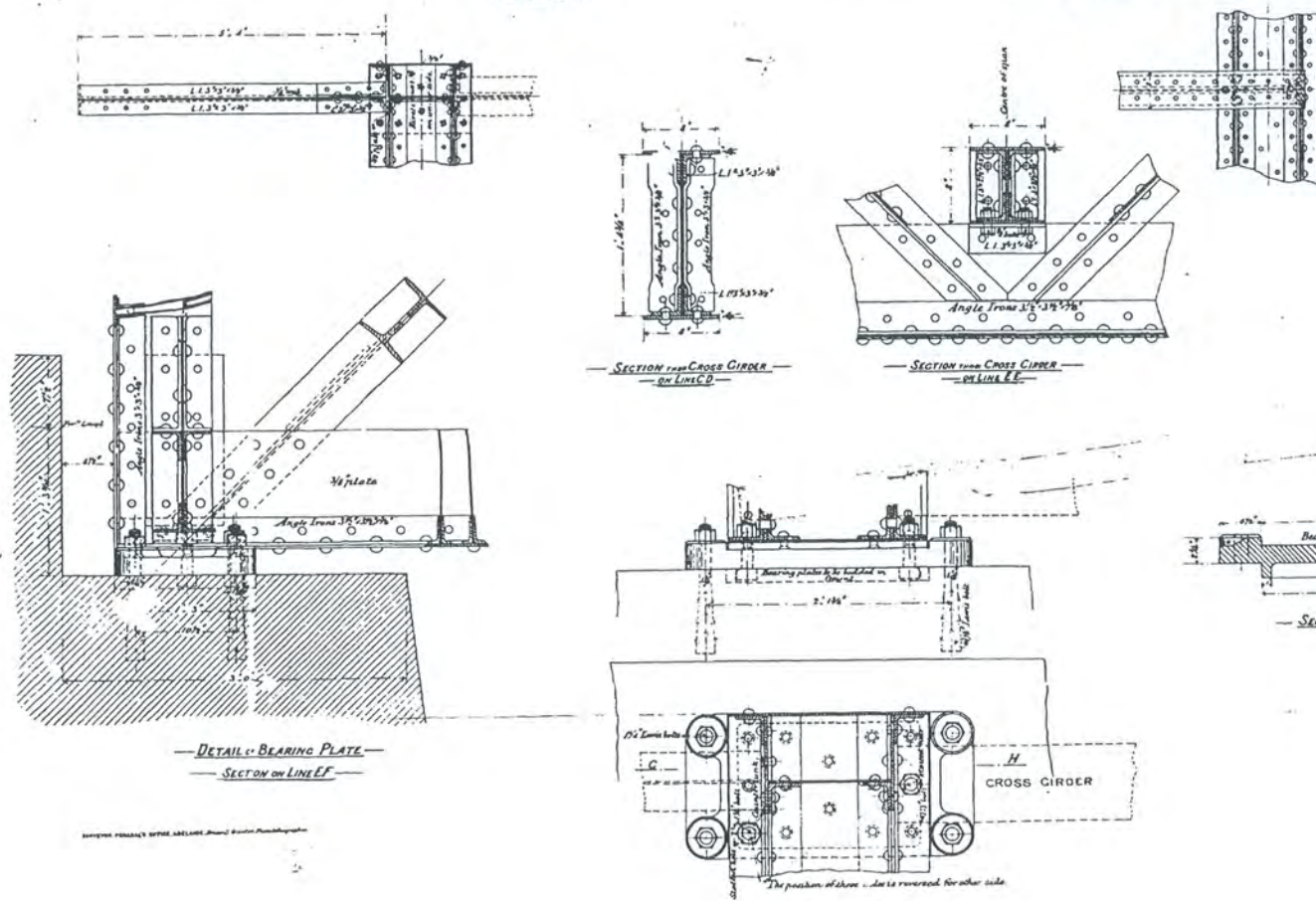
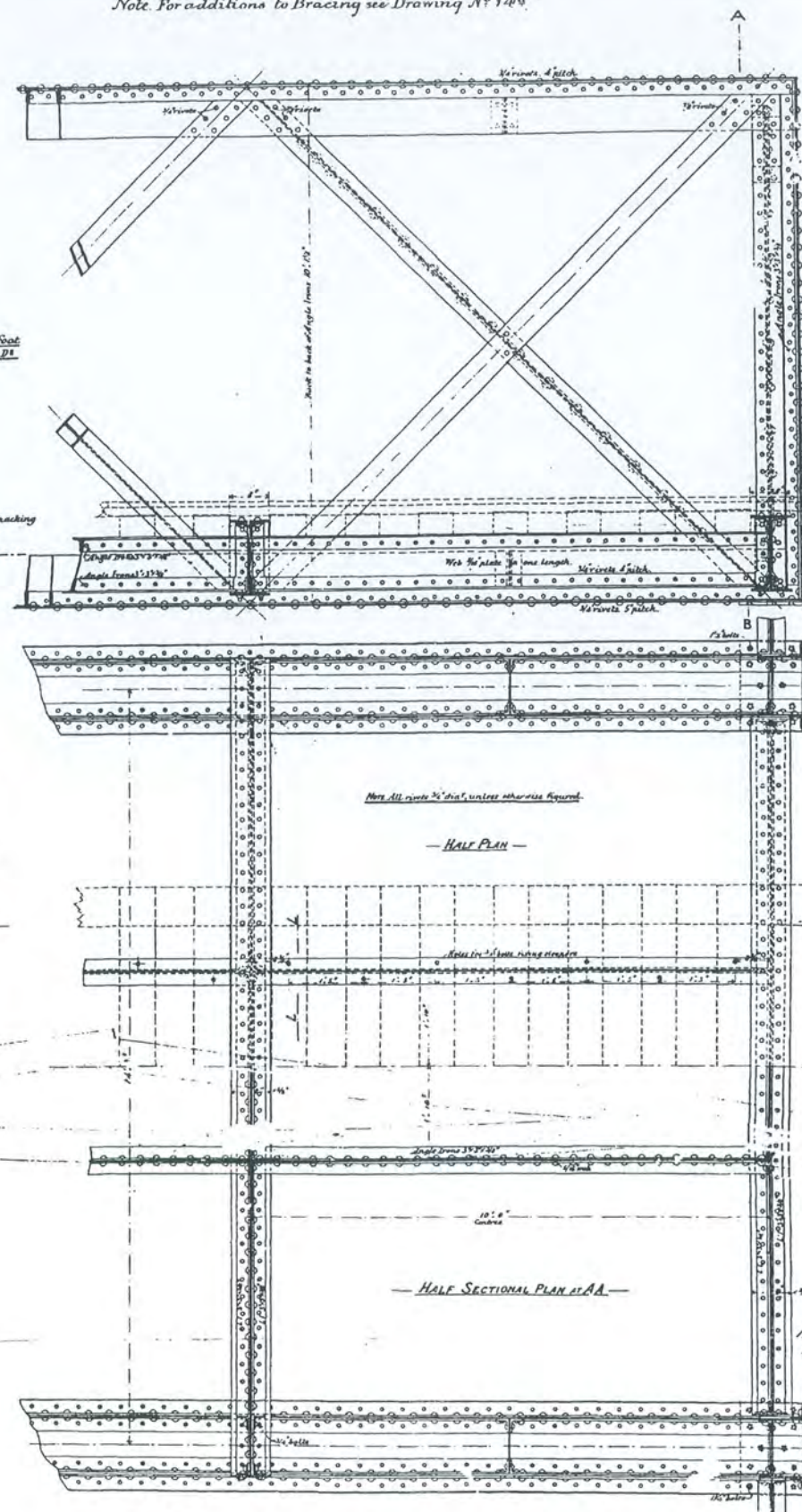
DRAWING N° 22
Sheet N° 3

Note. For additions to Bracing see Drawing N° 149.



— Scales —
General Scale 3/4\"

Note. When the sleepers require packing
lapped plate must be used.



H. H. H.
Engineer in Charge

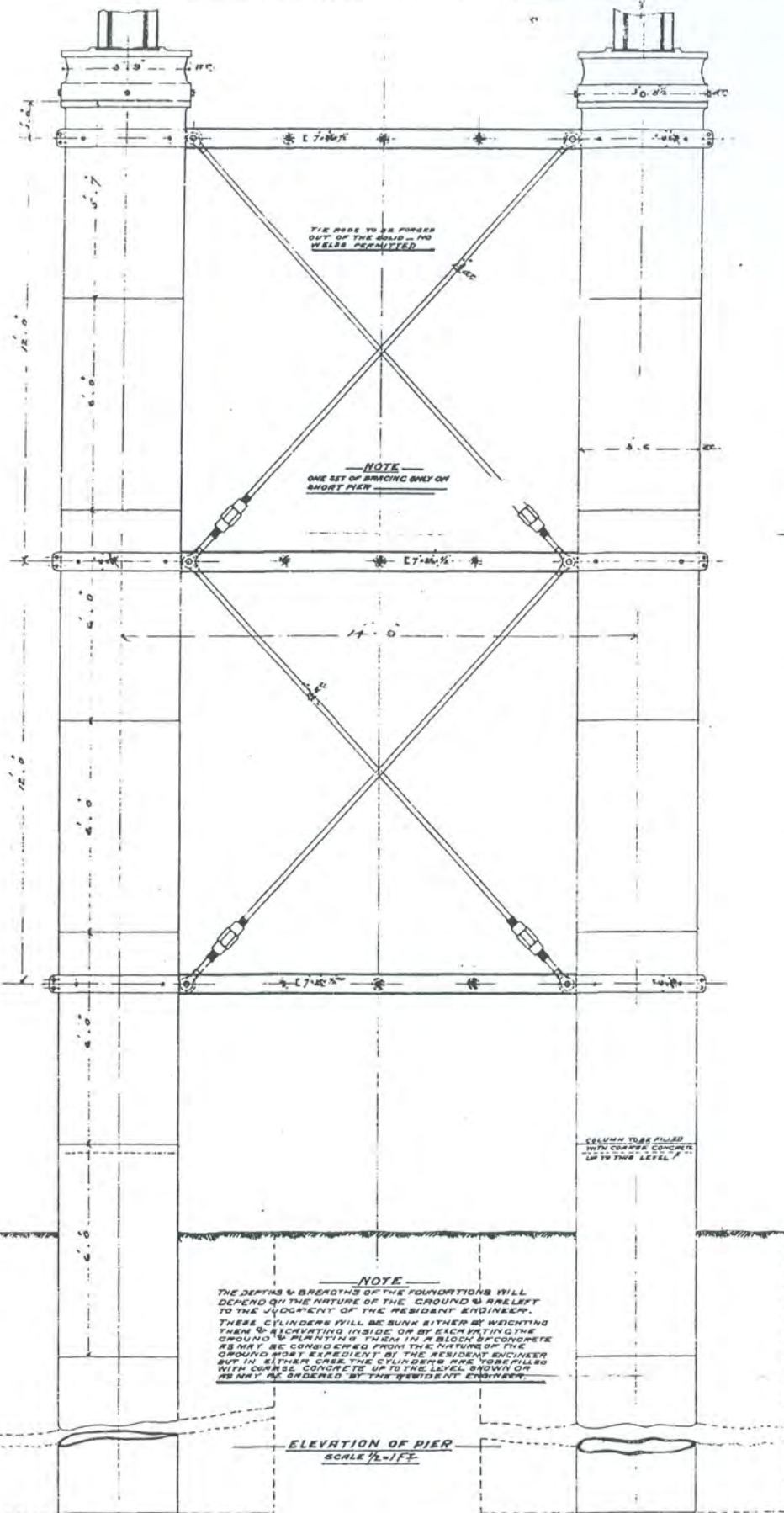
CHIEF
SOUTH
11/1/15
AUSTRALIAN
CL 15

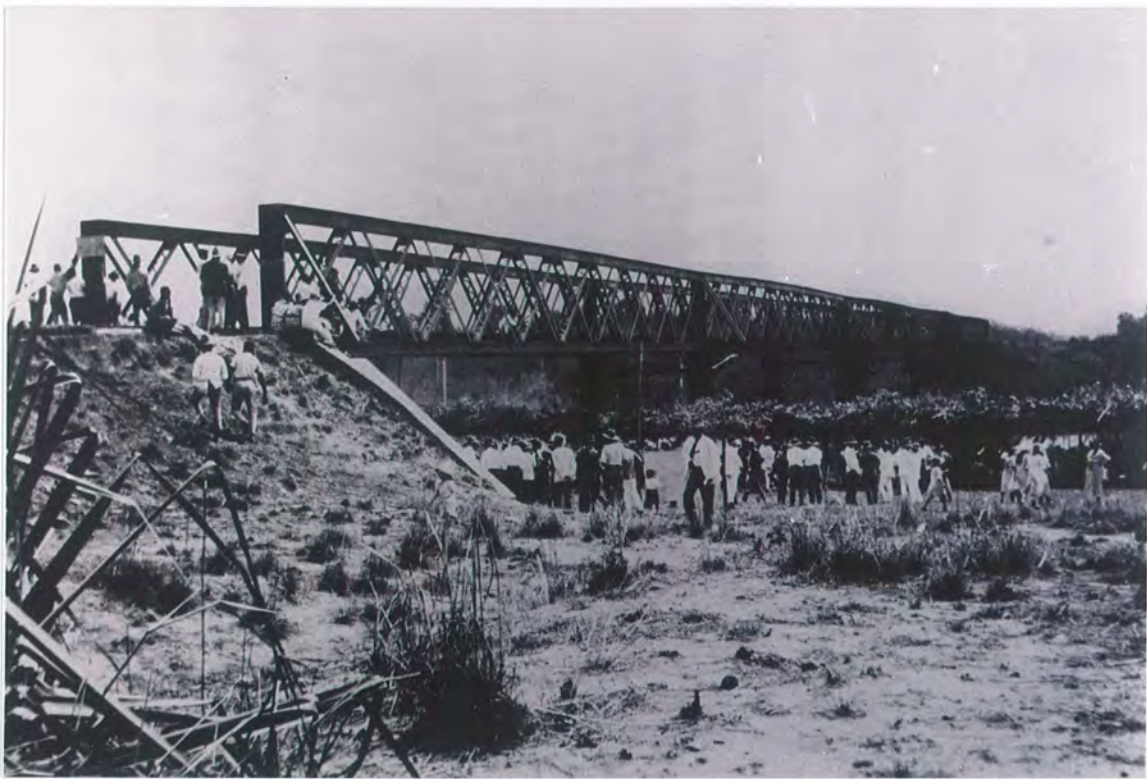
SOUTH AUSTRALIAN RAILWAYS.
PALMERSTON & PINE CREEK LINE

Division B

3.6 Gauge

BRIDGE OVER RIVER ADELAIDE
DETAILS OF IRON PIERS





Northern Territory Library and Information Services – Territory Images

File: 28\28491

Title: Group of Men

Description: A meeting of a large group of men at the Adelaide River Railway Bridge built in 1888

Date: ?

Photo Number: PH0314/0014

Creator:

Collection: Hilary Rowe

Copying: NTL Location: Adelaide River

Subjects:

(Displayed at Adelaide River Railway Heritage Precinct and notated as "Opening Of Adelaide River Bridge, 1888")



Northern Territory Library and Information Services – Territory Images

File: 27\27400

Title: River

Description: Men on the Adelaide River, one in a dinghy, one swimming. A bridge crosses the river.

Date: 189?

Photo Number: PH0275/0013

Creator: UNK

Collection: Historic Photos

Copying: NTL Location: Adelaide River

Subjects: Bridges, Railroad Bridges, Rivers, Dinghies



Northern Territory Library and Information Services – Territory Images

File: 13\13598

Title: Railway Bridge over Adelaide River

Description: Railway Bridge over Adelaide River

Date: ?

Photo Number: PH0168/0074

Creator: Brian Woodrow Collection: WOODROW

Copying: NTL

Location: Adelaide River

Subjects: North Australian Railway



Northern Territory Library and Information Services – Territory Images

File: 01\01893

Title: Adelaide River bridge

Description: Adelaide River bridge. View from river below. Group of people at the River in foreground.

Date: 194?

Photo Number: PH0045/0013

Creator: Minnie Thompson

Collection: Thompson

Copying: State Reference Library

Location: Adelaide River

Subjects: Bridges, Railroad Bridges,

Soldiers, Women soldiers



Northern Territory Library and Information Services – Territory Images

File: 17\17035

Title: Railway Bridge

Description: Railway Bridge over Adelaide River

Date: 1952

Photo Number: PH0236/0035

Creator:

Collection: Colin Gill

Copying: NTL Location: Adelaide River

Subjects: North Australian Railway



Northern Territory Library and Information Services – Territory Images

File: 03\03097

Title: Adelaide River Railway Bridge

Description: Adelaide River Railway Bridge

Date: 1961

Photo Number: PH0049/0405

Creator: Fay Cheater

Collection: Cheater

Copying: State Reference Library

Location: Adelaide River

Subjects: Rivers, Railroad Bridges



The AHC Photographic Database

RT-ID: RT01142
 Date Taken: Aug 84
 Location: Stuart Hwy, Adelaide River, NT

Title: Adelaide River Railway Bridge
 Photographer: McKinnon, J
 Keyword: Bridges, Railways



The AHC Photographic Database

RT-ID: RT01138
 Date Taken: Aug 84
 Location: Stuart Hwy, Adelaide River, NT

Title: Adelaide River Railway Bridge
 Photographer: McKinnon, J
 Keyword: Bridges, Railways



Private Collection

Title: View of Adelaide River Railway Bridge from the South bank
Date Taken: Aug 2001

Photographer: George Curran

Location: Adelaide River, NT



Private Collection

Title: View looking North along Adelaide River Railway Bridge
Date Taken: Aug 2001

Photographer: George Curran

Location: Adelaide River, NT